

1. (Currently Amended) A transmitting system comprising:

a processor to process at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps, the processor being configured to maintain the collimation of the input beams so that the multiple time-delayed output taps maintain the collimation of the input beam, the multiple time-delayed output taps being spatially distributed, spatially distinct and independently phase shifted;

an integration lens to receive the ~~phase-modulated~~ time-delayed output taps and to reintegrate the ~~phase-modulated~~ time-delayed output taps into a single integrated encoded beam with a time series chip sequence;

an optical fiber to receive the integrated encoded beam from the integration lens and to transmit the integrated encoded beam; and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

2. (Currently Amended) A receiving system comprising:

a processor to process the encoded collimated light beams received from a transmitter to produce multiple time-delayed output taps, the processor being configured to maintain the collimation of the light beams so that the multiple time-delayed output taps maintain the collimation of the light beams, the multiple time-delayed output taps being spatially distributed, spatially distinct and independently phase shifted;

an integration lens to receive the ~~phase-shifted~~ time-delayed output taps and to reintegrate the ~~phase-shifted~~ time-delayed output taps into a single decoded beam;

and a photo detector to receive the integrated decoded beam and to generate an output;
and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

3. (Currently Amended) A transmitting system comprising:

an optical tapped delay line device to process at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps that maintain the collimation of the input beam, optical tapped delay line device having a cavity with front and

back surfaces, wherein one of the front and back surfaces of the cavity phase adjusts the phase of the input beam travelling within the cavity;

an integration lens to receive the phase-modulated time-delayed output taps and to reintegrate the phase modulated output taps into a single integrated encoded beam with a time series chip sequence;

an optical fiber to receive the integrated encoded beam from the integration lens and to transmit the integrated encoded beam; and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

4. (Previously Presented) The system of claim 3, wherein the optical tapped delay device includes an etched plate having an etch depth sufficient to produce a desired phase shift through the time delayed output taps.

5. (Currently Amended) A transmitting system comprising:

an optical tapped delay line device to process at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps that maintain the collimation of the input beam;

a phase modulator to independently phase modulate each of the time-delayed output taps;

an integration lens to receive the phase modulated time-delayed output taps and to reintegrate the phase modulated time-delayed output taps into a single integrated encoded beam with a time series chip sequence;

an optical fiber to receive the integrated encoded beam from the integration lens and to transmit the integrated encoded beam; and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

6. (Currently Amended) A receiving system comprising:

an optical tapped delay line device to process encoded collimated light beams received from a transmitter to produce multiple time-delayed output taps that maintain the collimation of the light beams;

a phase modulator to independently phase modulate each of the time-delayed output taps;

an integration lens to receive the phase modulated time-delayed output taps and to reintegrate the phase modulated time-delayed output taps into a single decoded beam;

a photo detector to receive the integrated decoded beam and to generate an output; and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the phase modulated time-delayed output taps.

7. (Currently Amended) A receiving system comprising:

an optical tapped delay line device, to process encoded collimated light beams received from a transmitter to produce multiple time-delayed output taps that maintain the collimation of the light beams which are independently phase shifted, the optical tapped delay line device having a cavity with front and back surfaces, wherein one of the front and back surfaces of the cavity phase adjusts the phase of the input beam travelling within the cavity;

an integration lens to receive the ~~phase-shifted~~ time-delayed output taps and to reintegrate the ~~phase-shifted~~ time-delayed output taps into a single decoded beam;

a photo detector to receive the integrated decoded beam and to generate an output; and

a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

8. (Previously Presented) The system of claim 7, wherein the multiple time-delayed output taps are mutually phase-shifted by an etched pattern on one of the front and back surface of the cavity as a function of the at least one frequency of the input beam which is an inverse reverse accumulated order of a corresponding pattern etched on the transmitter.

9. (Currently Amended) A transmitting method comprising:

processing at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps that maintain the collimation of the input beam, the multiple time-delayed output taps being spatially distributed, spatially distinct and independently phase shifted;

independently phase modulating each of the time-delayed output taps;

receiving the phase modulated time-delayed output taps at an integration lens;

reintegrating the phase modulated time-delayed output taps into a single integrated encoded beam with a time series chip sequence;

receiving, via an optical fiber, the integrated encoded beam from the integration lens; transmitting the integrated encoded beam; and

providing a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

10. (Currently Amended) A receiving method comprising:

processing encoded collimated light beams received from a transmitter to produce multiple time-delayed output taps that maintain the collimation of light beams, the multiple time-delayed output taps being spatially distributed, spatially distinct and independently phase shifted;

receiving, at an integration lens, the phase-shifted time-delayed output taps;

reintegrating the phase-shifted time-delayed output taps into a single decoded beam;

receiving the integrated decoded beam at a photo detector;

generating an output from the integrated decoded beam; and

providing a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

11. (Currently Amended) A transmitting method comprising:

processing, with an optical tapped delay line device, at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps that maintain the collimation of the input beam, the optical tapped delay line device having a cavity

with front and back surfaces, wherein one of the front and back surfaces of the cavity phase adjusts the phase of the input beam travelling within the cavity;

receiving, at an integration lens, the phase-modulated time-delayed output taps;

reintegrating the phase-modulated time-delayed output taps into a single integrated encoded beam with a time series chip sequence;

receiving, at an optical fiber, the integrated encoded beam from the integration lens;

transmitting the integrated encoded beam; and

providing a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

12. (Currently Amended) A receiving method comprising:

processing encoded collimated light beams received from a transmitter to produce multiple time-delayed output taps that maintain the collimation of the light beams, the multiple time-delayed output taps being spatially distributed;

independently phase modulating each of the time-delayed output taps being spatially distributed, spatially distinct;

independently phase modulating each of the time-delayed output taps;

receiving, at an integration lens, the phase shifted time-delayed output taps;

reintegrating the phase shifted time-delayed output taps into a single integrated decoded beam;

receiving the integrated decoded beam at a photo detector;

generating an output from the integrated decoded beam; and

providing a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

13. (Currently Amended) A transmitting method comprising:

processing, with an optical tapped delay line device, at least one collimated input beam which has been modulated with a data signal to produce multiple time-delayed output taps that maintain the collimation of the input beam;

independently phase modulating each of the time-delayed output taps;
receiving, at an integration lens, the phase modulated time-delayed output taps;
reintegrating the phase modulated time-delayed output taps into a single integrated
encoded beam with a time series chip sequence;
receiving, at an optical fiber, the integrated encoded beam from the integration lens;
transmitting the integrated encoded beam; and
providing a variable reflectivity surface which ~~varies decreases~~ in reflectivity along its
length and which is configured to impart a desired amplitude profile onto the time-delayed
output taps.

14. (Currently Amended) A receiving method comprising:

processing, with an optical tapped delay line device, encoded collimated light beams
received from a transmitter to produce multiple time-delayed output taps that maintain the
collimation of the light beams which are independently phase shifted, the optical tapped delay
line device having a cavity with front and back surfaces, wherein one of the front and back
surfaces of the cavity phase adjusts the phase of the input beam travelling within the cavity;
receiving, at an integration lens, the phase shifted time-delayed output taps;
reintegrating the phase shifted time-delayed output taps into a single decoded beam;
receiving the integrated decoded beam at a photo detector;
generating an output from the integrated decoded beam; and
providing a variable reflectivity surface which ~~varies decreases~~ in reflectivity along its
length and which is configured to impart a desired amplitude profile onto the time-delayed
output taps.

15. (Previously Presented) The system of claim 1, wherein the modulation can be implemented
in a spectral domain.

16. (Previously Presented) The system of claim 2, wherein the modulation can be implemented
in a spectral domain.

17. (Previously Presented) The system of claim 3, wherein the modulation can be implemented

in a spectral domain.

18. (Previously Presented) The system of claim 5, wherein the modulation can be implemented in a spectral domain.

19. (Previously Presented) The system of claim 6, wherein the modulation can be implemented in a spectral domain.

20. (Previously Presented) The system of claim 7, wherein the modulation can be implemented in a spectral domain.

21. (Previously Presented) The system of claim 1, wherein the system can be used with an optical equalizer.

22. (Previously Presented) The system of claim 2, wherein the system can be used as an optical equalizer.

23. (Previously Presented) The system of claim 3, wherein the system can be used as an optical equalizer.

24. (Previously Presented) The system of claim 5, wherein the system can be used as an optical equalizer.

25. (Previously Presented) The system of claim 6, wherein the system can be used with an optical equalizer.

26. (Previously Presented) The system of claim 7, wherein the system can be used as an optical equalizer.

27. (Previously Presented) The system of claim 1, wherein the system can be used in wide-band signal generation.

28. (Previously Presented) The system of claim 2, wherein the system can be used in wide-band signal generation.

29. (Previously Presented) The system of claim 3, wherein the system can be used in wide-band signal generation.

30. (Previously Presented) The system of claim 5, wherein the system can be used in wide-band signal generation.

31. (Previously Presented) The system of claim 6, wherein the system can be used in wide-band signal generation.

32. (Previously Presented) The system of claim 7, wherein the system can be used in wide-band signal generation.

33. (Currently Amended) A receiving system comprising:

- an optical tapped delay line device having a cavity to process at least one collimated input beam to produce multiple time delayed spatially distributed, spatially distinct output taps in a linear array, the cavity being configured to maintain the collimation of the input beam so that the multiple time-delayed output taps maintain the collimation of the input beam;

- a second input beam which projects at an angle to a plane of the optical tapped delay line linear array to interfere with each optical tapped delay line beam and establish a region of spatial overlap of the optical tapped delay line beams;

- a two-dimensional photo detector array arranged to sample the interfering beams and spatially operate on the beams in the regions of spatial overlap;

- an electronic amplifier to sample the two-dimensional photo detector array; and

- a variable reflectivity surface which ~~varies~~ decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

34. (Previously Presented) The system of claim 33, wherein the optical tapped delay line input

beam is modulated with a data signal and the second input beam is a coherent reference.

35. (Previously Presented) The system of claim 33, wherein the optical tapped delay line input beam is a coherent reference and the second input beam is modulated with a data signal.

36. (Currently Amended) A receiving system comprising:

- an optical tapped delay line device having a cavity to process at least one collimated input beam to produce multiple time delayed spatially distributed, spatially distinct output taps in a linear array; the cavity being configured to maintain the collimation of the input beam so that the multiple time-delayed output taps maintain the collimation of the input beam;

- second optical tapped delay line device having a cavity to process at least one collimated input beam to produce multiple time delayed spatially distributed, spatially distinct output taps in a linear array, the cavity being configured to maintain the collimation of the input beam so that the multiple time-delayed output taps maintain the collimation of the input beam, wherein each optical tapped delay line beam interferes with the corresponding beam of the first optical tapped delay line and establishes a region of spatial overlap of the optical tapped delay line beams;

- a two-dimensional photo detector array arranged to sample the interfering beams and spatially operate on the beams in the regions of spatial overlap;

- an electronic amplifier to sample the two-dimensional photo detector array; and

- a variable reflectivity surface which varies decreases in reflectivity along its length and which is configured to impart a desired amplitude profile onto the time-delayed output taps.

37. (Previously Presented) The system of claim 36, wherein output tap to output tap delays propagate in a same direction in the optical tapped delay line device and the second optical tapped delay line device and an output of the receiving system is a correlation of the signals on the input beams.

38. (Previously Presented) The system of claim 36, wherein output tap to output tap delays propagate in opposite directions in the optical tapped delay line device and the second optical tapped delay line device, and an output of the receiving system is a convolution of the signals on the input beams.